

pressure below 29.50, rain on the north Pacific coast and over the middle plateau region, and wind velocities of 30 to 50 miles per hour in the Dakotas. Following a course similar to that pursued by number VII, this disturbance disappeared north of the Saint Lawrence Valley the night of the 24th. On the 23d wind velocities of 30 to 40 miles per hour and rain were reported from the British Northwest Territory to Kansas, and severe local storms occurred in Nebraska. During the 24th the storm diminished in strength and rain fell in areas from the Red River of the North Valley to New Mexico.

The period of high temperature noted in connection with low areas VI and VII continued. In upper Michigan the 23d was the warmest September day on record. In Minnesota, parts of Iowa, in lower Michigan and thence eastward to New England the weather was unusually warm, and from the 22d to 24th the highest temperature of the month was noted from the middle Mississippi valley and the east part of the Lake region to the east Gulf states.

IX.—Appeared central over northern Alberta on the 25th, and moved to Manitoba by the evening of the 26th, with central pressure below 29.50, and rain along the middle-eastern slope of the Rocky Mountains and in the middle Missouri valley. By the morning of the 27th the center of disturbance moved to the Lake Superior region, and during that date the center shifted its position to South Dakota, this course being apparently influenced in some degree by high pressure to the eastward attending high area V. On this date the rain extended over the central valleys, and a heavy windstorm was reported in the north-central counties of Minnesota. By the 28th the center had moved to the Lake Superior region, with rain in the central valleys and over the west part of the Lake region,

high winds from the lower Missouri and middle Mississippi valleys to the Great Lakes, violent gales over the upper lakes, and local storms in the middle Mississippi valley. Moving eastward the storm-center disappeared over the Gulf of Saint Lawrence the night of the 29th. On this date the rain area extended to the Atlantic coast, and gales of exceptional severity prevailed over the Lake region.

X and Xa.—Low area X advanced from the north Pacific Ocean and the evening of the 28th was central over Alberta, with rain and hard gales on the north Pacific coast. On this date the greatest abnormal fall in pressure in 12 hours noted for the month, .62, was reported at Calgary, N. W. T. During the 29th the storm-center moved slowly eastward north of Montana, with pressure below 29.40, the lowest pressure noted for the month, 29.32, being reported at Medicine Hat, N. W. T., in the morning. On this date the rain area extended over the northern plateau region, and wind velocities of 30 to 60 miles were reported in the middle and upper Missouri valleys. During the 30th this storm area was apparently deflected southward by high area VI, which occupied the east part of the Lake region, and appeared to unite with low area Xa, which occupied the middle plateau region on the 29th. Low area Xa developed great energy during its passage eastward, central pressure falling below 29.40 and wind velocities of 30 to 60 miles per hour from Utah to the middle Missouri valley being reported on the 29th and 30th, and the first snow of the season fell over Montana, Idaho, northern Nevada, northern Wyoming, east Oregon, and in the mountains of east-central California on the 30th. Attending the recurve of low area X on the 30th, the greatest abnormal rise in temperature in 12 hours noted for the month, 26°, was reported at Winnipeg, Man.

Tabulated statement showing principal characteristics of areas of high and low pressure.

Barometer.	First observed.			Last observed.			Duration.	Velocity per hour.	Maximum pressure change and maximum abnormal temperature change in twelve hours and maximum wind velocity.												
	Date.	Lat. N.	Long. W.	Lat. N.	Long. W.	Station.			Rise.	Date.	Station.	Fall.	Date.	Station.	Direction.	Miles per hour.	Date.				
High areas.		°	°	°	°	Days.	Miles.		Inch.			°									
I.....	1	52	114	46	64	4-5	28	Calgary, N. W. T.....	.42	1	Rapid City, S. Dak.....	.28	1	Fort Sill, Okla. T.....	n.	32	2				
II.....	5	52	109	40	72	5-5	21	Minnedosa, Man.....	.40	5	Moorhead, Minn.....	.16	8	Kitty Hawk, N. C.....	e.	20	11				
III.....	12	50	103	36	75	5-0	20	Medicine Hat, N. W. T.....	.36	12	San Antonio, Tex.....	.18	14	Jupiter, Fla.....	ne.	36	17				
IV.....	19	47	80	42	72	1-0	21	Port Arthur, Ont.....	.42	18	Rockliffe, Ont.....	.17	19	Kitty Hawk, N. C.....	ne.	18	20				
V.....	23	46	125	42	70	3-0	40	Calgary, N. W. T.....	.62	23	Dodge City, Kans.....	.27	24	Fort Canby, Wash.....	nw.	16	22				
VI.....	27	47	125	45	74	3-0	40	Father Point, Quebec....	.44	30	Concordia, Kans.....	.23	29	Abilene, Tex.....	n.	36	29				
Mean.....						3-7	28		.44			.21					26				
Low areas.									Fall.			Rise.									
I.....	1	47	98	49	69	3-0	22	La Crosse, Wis.....	.28	1	La Crosse, Wis.....	.15	1	Custer Station, Mont.....	n.	60	1				
II.....	2	51	116	49	90	2-5	20	Calgary, N. W. T.....	.56	2	Custer Station, Mont.....	.24	3	Huron, S. Dak.....	se.	42	4				
III.....	4	36	82	50	64	2-5	23	Rockliffe, Ont.....	.24	6	Kingston, Ont.....	.11	0	Sandy Hook, N. J.....	e.	28	5				
IV.....	9	51	115	50	67	3-5	30	Medicine Hat, N. W. T.....	.38	9	Bismarck, N. Dak.....	.18	10	Huron, S. Dak.....	se.	44	10				
V.....	13	45	119	43	77	2-5	35	Qu'Appelle, N. W. T.....	.52	13	La Crosse, Wis.....	.21	14	Swift Current, N. W. T.....	se.	40	13				
VI.....	14	50	111	50	69	3-5	32	Calgary, N. W. T.....	.38	14	Duluth, Minn.....	.21	17	Huron, S. Dak.....	se. #	44	16				
Vla.....	15	38	118	45	103	1-0	37	Winnemucca, Nev.....	.14	15	Winnemucca, Nev.....	.14	15	Keeler, Cal.....	sw.	49	15				
VII.....	17	52	128	47	82	3-5	25	Prince Albert, N. W. T.....	.34	18	Pierre, S. Dak.....	.23	18	Moorhead, Minn.....	sw.	54	19				
VIII.....	22	52	112	49	87	2-0	24	do.....	.38	22	Denver, Colo.....	.20	23	Huron, S. Dak.....	s. †	50	22				
IX.....	25	53	113	50	68	4-5	31	Medicine Hat, N. W. T.....	.40	25	Medicine Hat, N. W. T.....	.24	25	Saint Louis, Mo.....	sw. ‡	46	28				
X.....	28	50	117	47	99	1-5	25	Calgary, N. W. T.....	.64	28	Winnipeg, Man.....	.26	30	Fort Canby, Wash.....	se.	72	28				
Xa.....	29	41	113	41	103	1-0	21	Salt Lake City, Utah.....	.44	29	Pueblo, Colo.....	.20	29	Sioux City, Iowa.....	s.	50	30				
Mean.....						2-6	27		.39			.20					48				

* Mount Washington, N. H., nw., 84, 18th. † Mount Washington, N. H., nw., 99, 25th. ‡ Mount Washington, N. H., nw., 89, 30th.

NORTH ATLANTIC STORMS FOR SEPTEMBER, 1891 (pressure in inches and millimeters; wind-force by Beaufort scale).

The paths of storms that appeared over the north Atlantic Ocean during September, 1891, are shown on Chart I. These paths have been determined from observations by shipmasters received through the co-operation of the Hydrographic Office, Navy Department, and the "New York Herald Weather Service."

Severe storms were encountered along the trans-Atlantic steamship routes; two storms of marked energy advanced from the sub-tropical region north of the West Indies; and

cyclonic disturbances appeared over the Gulf of Mexico during the second and third decades of the month.

On the 1st a storm of great energy was central northwest of the British Isles, whence it moved slowly eastward over the North Sea by the 3d, with violent gales and heavy rain in Great Britain and Ireland. On the 6th a storm appeared central northeast of the Bahamas, whence it moved rapidly northward to the east New England coast the evening of the 7th, and passed thence northeastward over Newfoundland during the early part of the 8th. During the 7th this storm was

attended by gales of hurricane force at sea, and at night by destructive wind and heavy rain over Nova Scotia. From the 6th to 12th low pressure continued over mid-ocean. On the 11th a cyclonic disturbance was central over the east part of the Gulf of Mexico, with heavy rain and high wind on the east Gulf coast. By the morning of the 12th the storm was central near extreme western Florida, after which it apparently dissipated. On the 14th a storm which apparently developed off the south Atlantic coast was central about midway between Bermuda and the North Carolina coast, whence it passed rapidly to Newfoundland by the 15th, and thence north-west of the British Isles by the 18th, with fresh to strong gales along the steamship routes.

On the 18th a cyclonic disturbance was indicated south of western Cuba. On the 19th the cyclone center was apparently located west-southwest of Havana, and on the 20th it was central over the middle Gulf, with high winds and heavy rain on the central and west Gulf coasts, and thunderstorms over the east Gulf. On the 18th a cyclone appeared northeast of the Windward Islands, whence it moved slowly northwestward and passed east of Bermuda about midnight of the 21st. Recurving eastward, the storm-center reached the 40th parallel in about longitude W. 45° on the 25th, where it apparently recurved northward and united with an area of low pressure which was central over Newfoundland on the 26th. The influence of this storm was felt at Bermuda from the 19th to 23d. On the 19th the wind at that place was northeast, force 2 to 4, with barometer falling to 29.88 (759) at 9 p. m. On the 20th the wind shifted from northeast to north-northeast, force 5, at noon, with pressure 29.71 (755) and to north at midnight, force 5 to 6, pressure 29.40 (747). On the 21st the wind shifted from north to north-northwest at 8 a. m., force 5 to 6, and pressure 29.21 (742), and to northwest at 2 p. m., force 5 to 6, pressure 29.15 (740). The barometer continued to fall until midnight, when it read 28.95 (735), with wind northwest, force 6 to 7, after which it rose to 29.55 (751) by midnight of the 22d, and to 29.90 (759) by 9 p. m. of the 23d, with wind shifting from northwest to north-northwest and diminishing in force. On the 21st a Spanish brig loaded with mahogany lumber was wrecked on the southwest shore of the island; the crew was saved. Trees were blown down; but little damage was caused to buildings.

During the last decade of the month the pressure continued low over mid-ocean, with periods of heavy gales, and on the 27th the pressure fell below 29.00 (737) in that region, and strong to whole gales continued until the close of the month. Heavy storms were reported in Great Britain on the 21st and 22d, and the pressure continued low over the British Isles from the 26th until the close of the month. On the 25th a disturbance was central over the west part of the Gulf of Mexico, with high winds along the west Gulf coast, and the evening of

that date it was apparently central south of the mouth of the Rio Grande River.

OCEAN ICE IN SEPTEMBER.

The following table shows the southern and eastern limits of the region within which icebergs or field ice were reported for September during the last 9 years:

Southern limit.			Eastern limit.		
Month.	Lat. N.	Long. W.	Month.	Lat. N.	Long. W.
September, 1883.....	45 25	47 10	September, 1883.....	49 01	44 33
September, 1884.....	45 06	53 21	September, 1884.....	47 39	49 14
September, 1885.....	45 40	48 22	September, 1885.....	46 40	46 27
September, 1886.....	45 40	53 00	September, 1886.....	48 00	48 40
September, 1887.....	45 37	40 50	September, 1887.....	45 37	40 50
September, 1888.....	Off Cape Race		September, 1888.....	53 00	52 08
September, 1889.....	46 21	48 22	September, 1889.....	48 59	46 48
September, 1890.....	45 30	48 00	September, 1890.....	50 30	46 22
September, 1891.....	Straits of Belle Isle		September, 1891.....	53 18	51 20
Mean.....	47 08	49 33	Mean.....	49 20	47 20

* On the 4th a large lump of ice 100 feet long and 6 feet above water was reported in N. 36° 46' W. 42° 18'; this is the lowest latitude in which ice was ever reported in the north Atlantic Ocean.

The table shows that in September, 1891, ice was reported about 4° north and about 4° west of the average southern and eastern limits of Arctic ice as determined from reports of the last 8 years. The southernmost ice, an iceberg, was reported in the Straits of Belle Isle on the 28th, and the easternmost ice, 6 icebergs, was observed on the 20th, in the position given. The table also shows that the current month is the only September during the last 8 years in which ice was not reported south of the 50th parallel. The ice reported for the current month was confined to the region lying between the Straits of Belle Isle and the 51st meridian, where it was observed during the first and third decades of the month. The positions of icebergs reported for September, 1891, are shown on Chart I by ruled shading.

FOG IN SEPTEMBER.

The limits of fog-belts west of the 40th meridian, as reported by shipmasters, are shown on Chart I by dotted shading. In the vicinity of the Banks of Newfoundland fog was reported on 11 dates; between the 55th and 65th meridians on 4 dates; and west of the 65th meridian on 8 dates. Compared with the corresponding month of the last 3 years the dates of occurrence of fog east of the 55th meridian numbered 5 less than the average; between the 55th and 65th meridians 3 less than the average; and west of the 65th meridian 2 more than the average.

The fog reported along the trans-Atlantic steamship routes west of the 40th meridian, and at Weather Bureau stations along the New England and New Jersey coasts, generally attended the advance or passage of general storms.

TEMPERATURE OF THE AIR (expressed in degrees, Fahrenheit).

Many of the voluntary stations do not have standard thermometers or shelters.

The distribution of mean temperature over the United States and Canada for September, 1891, is exhibited on Chart II by dotted isotherms. In the table of miscellaneous meteorological data the monthly mean temperature and the departure from the normal are given for regular stations of the Weather Bureau. The figures opposite the names of the geographical districts in the columns for mean temperature and departure from the normal show, respectively, the average for the several districts. The normal for any district may be found by adding the departure to the current mean when the departure is below the normal and subtracting when above. The monthly mean temperature for regular stations of the Weather Bureau represents the mean of the maximum and minimum temperatures.

At stations in the Colorado Desert in the east part of San

Diego county, Cal., the mean temperature was above 90; the mean values were above 80 in west Arizona and southeast California, along the lower Rio Grande river, and in southern Florida. The mean temperature was lowest at points along the North Saskatchewan River, British America, and at mountain stations in central Colorado, where it was below 50; the mean readings were below 55 at stations on the Central Pacific Railway crossing the summit of the Sierra Nevada Mountains in California, at Rocky Mountain stations in east Idaho, west Montana, and west Wyoming, in the British Northwest Territory, and in the lower Saint Lawrence valley.

DEPARTURES FROM NORMAL TEMPERATURE.

The mean temperature was generally above the normal, slight deficiencies being reported in Florida, along the coast of the